MODELLING TOURISM AND CULTURE EXPENDITURE IN ROMANIA – EVIDENCE OF CHANGE IN CULTURAL VALUES

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ABSTRACT
The world is constantly changing. And the pace of this change seems to be faster and faster. National culture is no exception. Although long viewed as difficult to change, cultural values also seem to be subject to the pressure of change. The importance of leisure time, considered a characteristic of indulgent cultures, is subject of analysis in this paper. The main purpose of this paper is to analyse whether the evolution of expenditures on tourism and cultural activities has had an upward evolution so as to justify the increase in the share of people who attach great importance to leisure time. To achieve this goal, we analysed the secondary data from WVS and performed a mathematical modelling of two sets of statistical data for the interval 2000 and 2020. The results showed that the growing importance of leisure time suggested by the analysis of WVS data is also supported by the evolution of spending on tourism and cultural activities. the implications are multiple. The question is whether cultural values are stable enough to be used in the cultural characterization of countries based on scores of cultural dimensions. Of course, research on several other cultural values is needed.

KEYWORDS: *cultural values, culture, mathematical modelling, Romania, tourism expenditure*.

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1. INTRODUCTION

In social anthropology, the term *culture* refers to all patterns of thought, feeling, and action. Culture also includes: how to greet, eat, express or withhold feelings, physical distance from others, body hygiene, etc. (Hofstede et al., 2010). The term culture is used to mark those parameters that differentiate each group in a meaningful way (Alas, 2006).
Although there can be significant differences between individuals in a country, studies show that when fundamental cultural values are compared, inland regions tend to cluster along national borders, not to spread or mix with other regions in the same cultural or geographical area (Minkov & Hofstede, 2012). But how easy can cultural values change? The theory of Inglehart (1997) and Welzel and Inglehart (2005) explicitly assumes that cultural values are changing, at least in the long run (Fink & Mayrhofer, 2009). Still, cultural values are seen as stable enough to be used to describe a culture by the instrumentality of cultural dimensions.
World Values Survey is a global network of researchers in the social sciences who study cultural values in dynamics and their impact on political and social life. The WVS survey began in 1981, and now covers almost 100 countries and 90% of the world's population. With approximately 400,000 respondents, WVS is the largest database available, with the data provided being used in many fields (Inglehart & Welzel, 2021). WVS data also have a major impact on other intercultural

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research, for example, Hofstede basing two new dimensions on the analysis of data provided by WVS: long term orientation and indulgence.
One of the cultural dimensions founded by Hofstede based on WVS research is *indulgence vs. restraint*. According to Hofstede, in countries with high permissive scores, more importance is given to free time, friends and freedom of expression, as opposed to countries where restraint predominates where these issues are not essential (Hofstede et al., 2010). The scores for the six cultural dimensions of Hofstede for Romania are illustrated in figure no. 1.

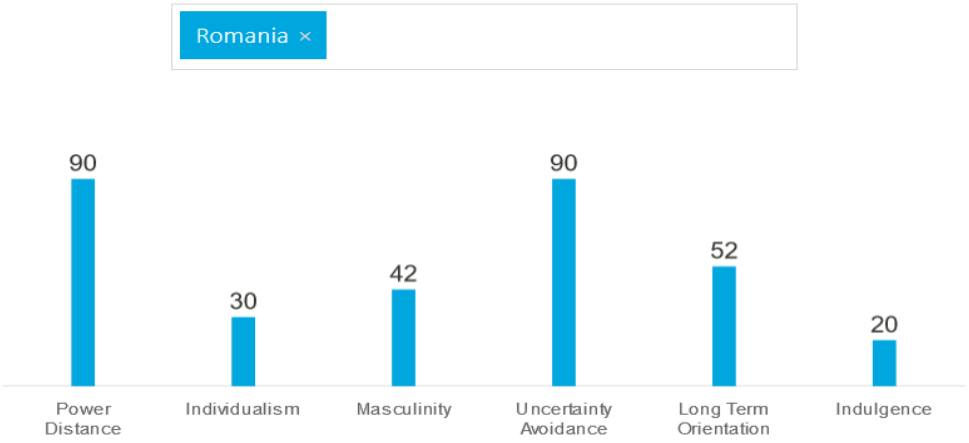

Figure 1. Hofstede's cultural dimensions scores for Romania (Geert, 2021)
Source: https://www.hofstede-insights.com/country-comparison/romania/

According to Hofstede, Romania, with a score of 20 (see figure no.1) is characterized as having a culture of *restraint* so most likely Romanians won't „*put much emphasis on leisure time and control the gratification of their desires*"(Geert, 2021). But a simple analysis of the perception on the importance of free time in Romania during 4 WVS waves will highlight significant changes in the percentages of people who attach great importance to leisure time.

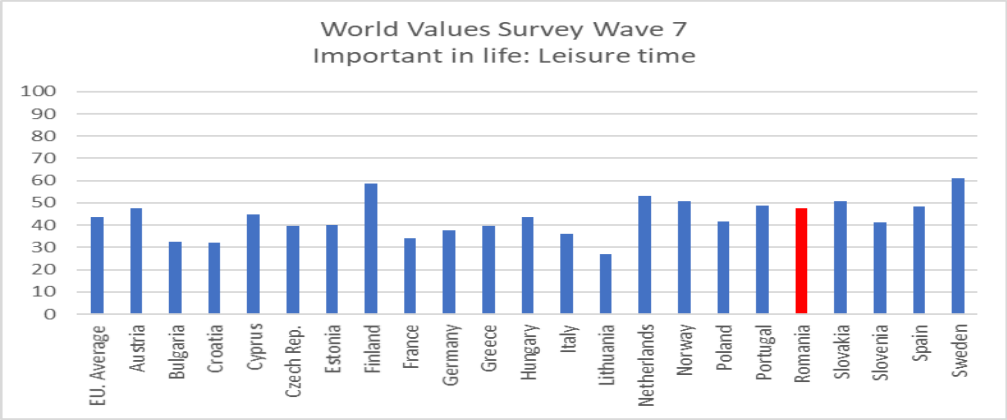

Figure 2. Share of people who state that leisure time is very important in life
Source: https://www.worldvaluessurvey.org/WVSOnline.jsp

Figure no. 2 illustrates the share of people that perceive leisure time as very important in most EU countries. Romania, with 47.6 percent is above the EU average of 43.5 percent (the EU average is calculated for the countries comprised in the WVS Wave 7). Changes over time are also obvious. In WVS Wave 3 survey, the share of people in Romania who perceived leisure time as very important was 27 percent, while in the last WVS survey the share was 47.6. It almost doubled in under 25 years.

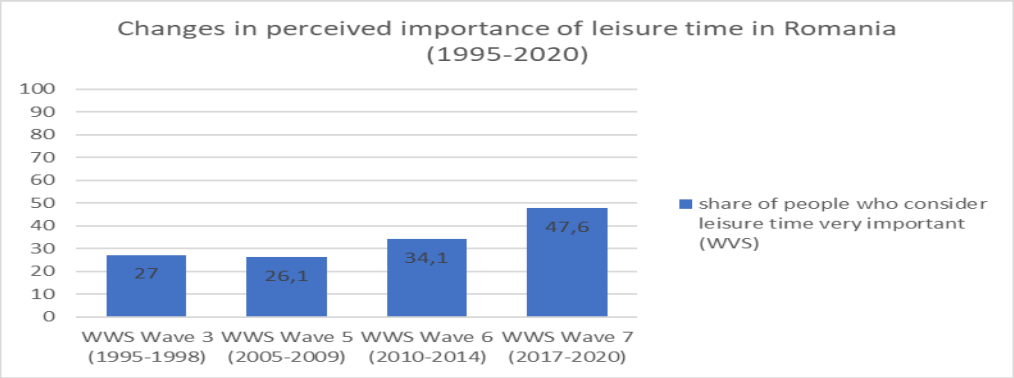

Figure 3. Changes in perceived importance of leisure time in Romania based on share of people who consider leisure time very important (1995-2020)
Source: https://www.worldvaluessurvey.org/WVSOnline.jsp

The change in cultural values seems noticeable, and the pace of change accelerated, but the analysis must be deepened to have a more accurate understanding of the phenomenon.

2. THEORETICAL BACKROUND AND RESEARCH QUESTION

The question that this research will try to answer is whether the evolution of expenditures on cultural and tourist activities has had an upward evolution so as to justify the increase in the share of people who attach great importance to leisure time. For a clearer view on the evolution of the importance of leisure time, we performed a mathematical analysis on longitudinal statistical data sets, as follows: 1) average monthly total income per household, by income categories and main social categories, by residence areas and 2) average monthly expenses per household for services by main social categories, by residence areas, both for the 2001–2020-time frame (INSSE, 2021).
The analysis of money spent on tourism or cultural activities, as well as the factors influencing these expenditures has been studied by several authors. A search in the Web of Science Core Collection for articles published in the 2001–2021-time frame by terms like expenditure, tourism and cultural returned 140 results, most of which were published in journals in Hospitality Leisure Sport Tourism (59 articles) and Economics (36 articles) categories.
Tourism and culture expenditure are determined by numerous different factors (Pulido-Fernandez et al., 2016), (Ignacio Pulido-Fernandez et al., 2020), (Mehran & Olya, 2019), (Castaneda et al., 2019), (Wang, 2020). Analysing the impact of several cultural indicators on tourism development, Peric et al argue that the "real GDP per capita and the level of human capital are significant drivers of tourism development" (Peric et al., 2021).
The relationship between culture and tourism is undeniable, but equivocal, and the relationship between culture and tourism has been the subject of research for papers in recent years (Jurdana et al., 2013), (van Loon & Rouwendal, 2017), (Dimitropoulos et al., 2018). Several authors have studied the link between culture and tourism by looking at the UNESCO World Heritage sites (Peric et al., 2021) (Amir, Osman, Bachok, & Ibrahim, 2017), (Amir, Osman, Bachok, & brahim, 2017), (Panzera et al., 2021)while others have analysed the spending patterns and the different expenditure drives. For example, Amir et al have shown that socio-demographic characteristics have a significant influence on tourism expenditure (Amir, Osman, Bachok, & Ibrahim, 2017), while Brida, Disegna and Osti examined the determinants of visitors' expenditure behaviour at cultural events (Brida et al., 2013). Ungerman and Iveta have developed a model that can predict the potential gains of the organisation of further cultural events (Ungerman & Iveta, 2014).

3. MATHEMATICAL MODELLING OF TOURISM AND CULTURAL ACTIVITIES EXPENDITURE IN ROMANIA

Formal mathematical techniques and observations will be used to model the expenditure on recreational activities (cultural and tourism) per Romanian household. Firstly, one must closely observe the data provided by the International Statistics Institute of Romania. Due to the monetary shift in 2005, values dating before said year have been passed through a currency converter.
Of course, there is no visualizing data without plotting it. Studying the apparent trend of the given data is crucial to modelling it.

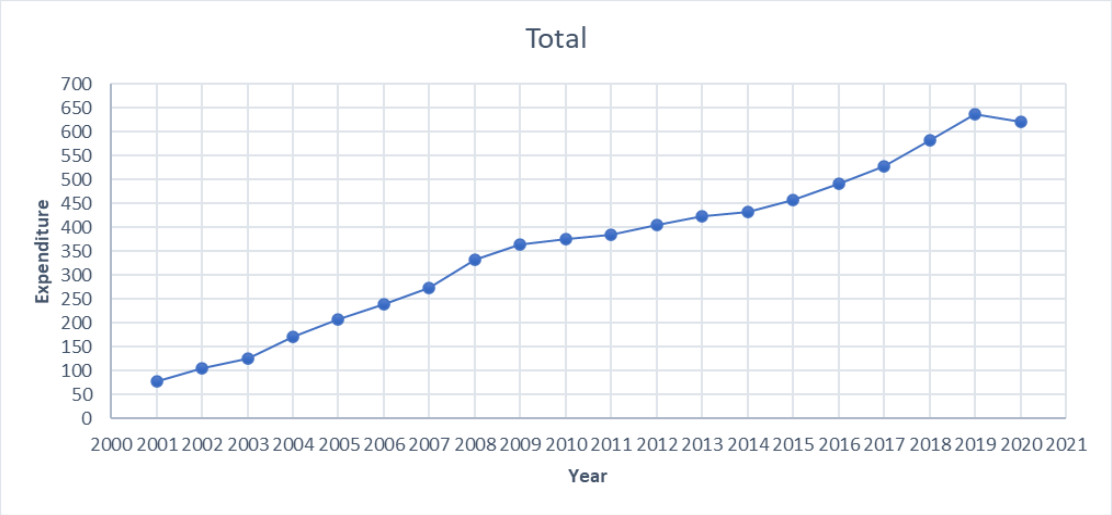

Figure 4. Total expenditure on tourism and cultural activities in Romania between 2000-2020.
Source: made by authors

As it can be seen, the total amount is close to perfect linearity (a truly outstanding property, since most real-world data doesn't fit this pattern), the only shifts in the rate of change being in key-moments, such as 2020's Covid-19 outbreak. Since the Total Amount data is linear, one would correctly assume that the Urban Total and Rural Total Amount would also be linear.

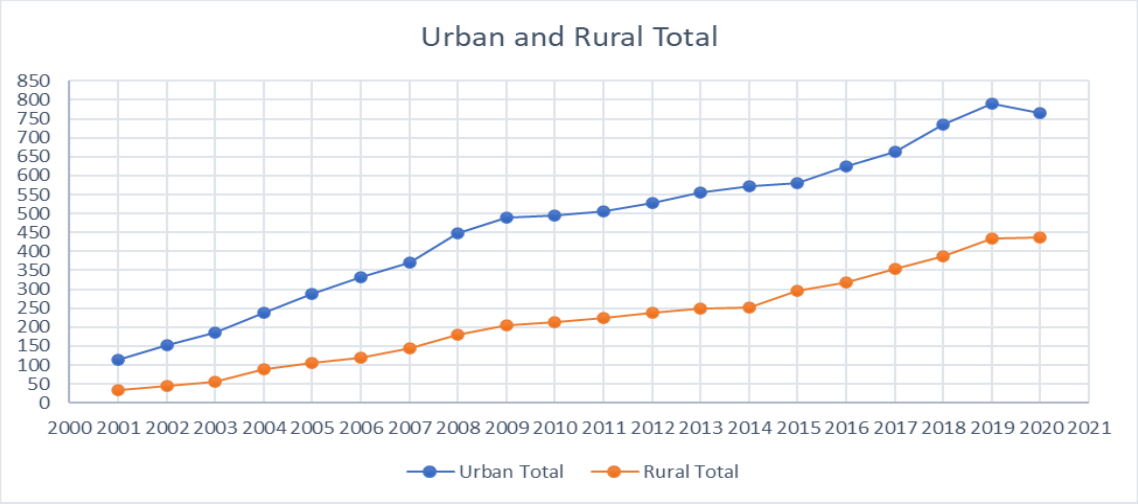

Figure 5. Total expenditure on tourism and cultural activities in Romania between 2000-2020
Source: made by authors

Now that the linearity of the studied problem has been established, a modelling hierarchy must be considered. For the sake of simplicity, this model will assume that all variables explaining the evolution of the Urban and Rural Total may be symbolized strictly by the passing of time. Following that, the aforementioned hierarchy comes naturally.

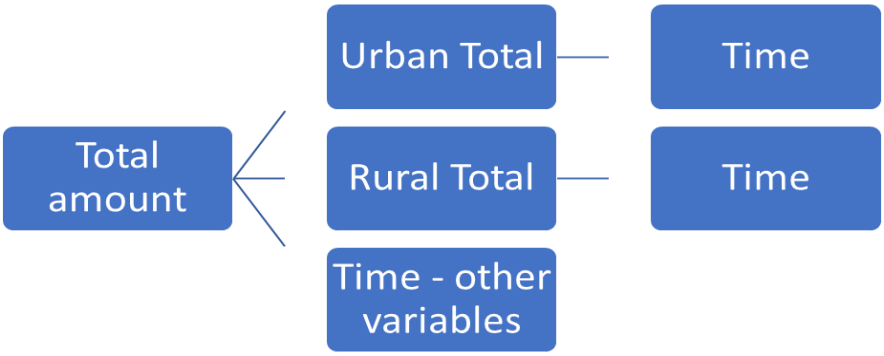

Figure 6. Modelling hierarchy
Source: made by authors

As a convention, from now on the year 2000 will be considered 0, 2001 will be considered 1 and so on. Let t, u and r be the functions representing the total, urban and rural amount respectively. Consider that time will be denoted with $\tau \geq 0$.

3.1. Modelling the Urban Total function

Given that the Urban Total data is linear, a linear function will be used to model it. Therefore, the aim is to find the function $u(\tau) = \alpha + \beta \cdot \tau$ which best fits all given data entries.
Mathematically, "best fits" refers to minimizing the expression $\|u(\tau) - u_{\text{given}}\|$. (in the context of this paper, $\|\cdot\|$ represents the Euclidean Norm).

$$\|u(\tau) - u_{\text{given}}\| - \text{minimum} \Leftrightarrow \sqrt{\sum_{i=1}^{20}[u(\tau_i) - u_i]^2} - \text{minimum} \Leftrightarrow \sum_{i=1}^{20}[u(\tau_i) - u_i]^2 - \text{minimum} \quad (1)$$

$$\Leftrightarrow \sum_{i=1}^{20}(\alpha + \beta \cdot \tau_i - u_i)^2 - \text{minimum} \quad (2)$$

It follows that, to determine the desired function, the expression $\sum_{i=1}^{20}(\alpha + \beta \cdot \tau_i - u_i)^2$ must be minimized. Let $A(\alpha, \beta) = \sum_{i=1}^{20}(\alpha + \beta \cdot \tau_i - u_i)^2$ be an auxiliary function. The problem of determining the minimum value of A can be reduced to the study of the following system of equations $\begin{cases} \frac{\partial A}{\partial \alpha} = 0 \\ \frac{\partial A}{\partial \beta} = 0 \end{cases}$.

$$\begin{cases} \frac{\partial A}{\partial \alpha} = 0 \\ \frac{\partial A}{\partial \beta} = 0 \end{cases} \Leftrightarrow \begin{cases} 2 \cdot \sum_{i=1}^{20}(\alpha + \beta \cdot \tau_i - u_i) = 0 \\ 2 \cdot \sum_{i=1}^{20}(\alpha + \beta \cdot \tau_i - u_i) \cdot \tau_i = 0 \end{cases} \Leftrightarrow \begin{cases} \alpha \cdot \sum_{i=1}^{20} 1 + \beta \sum_{i=1}^{20} \tau_i - \sum_{i=1}^{20} u_i = 0 \\ \alpha \cdot \sum_{i=1}^{20} \tau_i + \beta \cdot \sum_{i=1}^{20} \tau_i^2 - \sum_{i=1}^{20} \tau_i u_i = 0 \end{cases} \quad (3)$$

After computing and substituting the values of the sums, the system becomes:

$$\begin{cases} 20\alpha + 210\beta - 9426.19 = 0 \\ 210\alpha + 2870\beta - 121487.7 = 0 \end{cases} \quad (4)$$

Performing the necessary computations will yield the unique solution of the studied system $\alpha = 115.85$, $\beta = 33.85$. Therefore, the function modelling the Urban Total data is $u(\tau) = 115.85 + 33.85 \cdot \tau$.

3.2. Modelling the Rural Total function

Similarly, to the Urban Total paragraph, the function $r(\tau) = \gamma + \delta \cdot \tau$ for which the expression $\|r(\tau) - r_{\text{given}}\|$ is minimal must be determined. Following completely analogous steps, the study of a system in the nature of the previous one will be reached.

$$\begin{cases} 20\gamma + 210\delta - 4380.28 = 0 \\ 210\gamma + 2870\delta - 59917.9 = 0 \end{cases} \quad (5)$$

Performing the necessary computations will yield the unique solution $\gamma = -0.85$, $\delta = 20.94$. Substituting the obtained values into the starting expression, it follows that $r(\tau) = -0.85 + 20.94 \cdot \tau$.

3.3. Compiling the results into the Total function

Keeping in mind the previously stated hierarchy and the fact that the Total data has a linear trend, Multiple Linear Regression will be used to express the Total function. In other words, the aim is to find the function $t(\tau) = a + b \cdot \tau + c \cdot u(\tau) + d \cdot r(\tau)$ which best explains the given Total data. Note that, when determining the coefficients a, b, c and d, the exact given data for $u(\tau_i)$ and $r(\tau_i)$ will be used for the sake of accuracy. Following that, substituting the expressions of $u(\tau)$ and $r(\tau)$ into the final form of our total function will be the finishing touches (the term $b\tau$ is used to represent the other, non-includable, variables explaining our model, simply through the passing of time).

Precisely as before, the following expression must be minimized $\|t(\tau) - t_{\text{given}}\|$.

$$\|t(\tau) - t_{\text{given}}\| - \text{minimum} \Leftrightarrow \sqrt{\sum_{i=1}^{20} [t(\tau_i) - t_i]^2} - \text{minimum} \Leftrightarrow \sum_{i=1}^{20} [t(\tau_i) - t_i]^2 - \text{minimum} \quad (6)$$

$$\Leftrightarrow \sum_{i=1}^{20} (a + b \cdot \tau_i + c \cdot u_i + d \cdot r_i - t_i)^2 - \text{minimum} \quad (7)$$

Let $H(a, b, c, d) = \sum_{i=1}^{20} (a + b \cdot \tau_i + c \cdot u_i + d \cdot r_i - t_i)^2$ be an auxiliary function. Entirely analogous with the previous steps, solving the following system is needed in order to determine its minimum.

$$\begin{cases} \frac{\partial H}{\partial a} = 0 \\ \frac{\partial H}{\partial b} = 0 \\ \frac{\partial H}{\partial c} = 0 \\ \frac{\partial H}{\partial d} = 0 \end{cases} \Leftrightarrow \begin{cases} 2 \cdot \sum_{i=1}^{20} (a + b\tau_i + cu_i + dr_i - t_i) = 0 \\ 2 \cdot \sum_{i=1}^{20} (a + b\tau_i + cu_i + dr_i - t_i) \cdot \tau_i = 0 \\ 2 \cdot \sum_{i=1}^{20} (a + b\tau_i + cu_i + dr_i - t_i) \cdot u_i = 0 \\ 2 \cdot \sum_{i=1}^{20} (a + b\tau_i + cu_i + dr_i - t_i) \cdot r_i = 0 \end{cases} \tag{8}$$

$$\Leftrightarrow \begin{cases} a \cdot \sum_{i=1}^{20} 1 + b \cdot \sum_{i=1}^{20} \tau_i + c \cdot \sum_{i=1}^{20} u_i + d \cdot \sum_{i=1}^{20} r_i - \sum_{i=1}^{20} t_i = 0 \\ a \cdot \sum_{i=1}^{20} \tau_i + b \cdot \sum_{i=1}^{20} \tau_i^2 + c \cdot \sum_{i=1}^{20} \tau_i u_i + d \cdot \sum_{i=1}^{20} \tau_i r_i - \sum_{i=1}^{20} \tau_i t_i = 0 \\ a \cdot \sum_{i=1}^{20} u_i + b \cdot \sum_{i=1}^{20} u_i \tau_i + c \cdot \sum_{i=1}^{20} u_i^2 + d \cdot \sum_{i=1}^{20} u_i r_i - \sum_{i=1}^{20} u_i t_i = 0 \\ a \cdot \sum_{i=1}^{20} r_i + b \cdot \sum_{i=1}^{20} r_i \tau_i + c \cdot \sum_{i=1}^{20} r_i u_i + d \cdot \sum_{i=1}^{20} r_i^2 - \sum_{i=1}^{20} r_i t_i = 0 \end{cases} \tag{9}$$

After computing and substituting the values of the sums, the system becomes.

$$\begin{cases} 20a + 210b + 9426.19c + 4380.28d - 7321.39 = 0 \\ 210a + 2870b + 121487.66c + 59917.9d - 94743.55 = 0 \\ 9426.19a + 121487.66b + 5225001.67c + 2540112.77d - 4058638.2 = 0 \\ 4380.28a + 59917.9b + 2540112.77c + 1256252.69d - 1982403.58 = 0 \end{cases} \tag{10}$$

Performing the necessary computations will yield the unique solution of this problem $a = -2.41$, $b = -0.05$, $c = 0.58$ and $d = 0.41$. Substituting these values into the general expression of our function, it follows that $t(\tau) = -2.41 - 0.05 \cdot \tau + 0.58 \cdot u(\tau) + 0.41 \cdot r(\tau)$.

Therefore, the Urban and Rural Total functions have the expressions $u(\tau) = 115.85 + 33.85 \cdot \tau$ and $r(\tau) = -0.85 + 20.94 \cdot \tau$ respectively. The Total function has the expression $t(\tau) = -2.41 - 0.05 \cdot \tau + 0.58 \cdot u(\tau) + 0.41 \cdot r(\tau)$. While the form depending on u and r is highly suggestive and of utmost usefulness, the Total function can be rewritten as $t(\tau) = 64.43 + 28.17\ \tau$.

Now that the desired functions have been completely determined, several observations can be raised. Firstly, the more obvious ones are forecasting values for a certain year or determining the year in which a certain total will be met. For instance, solving a few simple computations will tell us that the total amount spent on recreational activities per Romanian household in 2021 will be 655.97. *Moreover, solving a rather straightforward equation will tell us that, if the trend will not vary, by February 2033, the total amount spent will surpass the* 1000lei *milestone.*
A more nuanced observation has to do with the u and r form of the Total function. After close examination of said function, one might notice the different weights the Urban and Rural Totals have (meaning that shifts in the Urban Total affect the Total amount more than shifts in the Rural

Total). Following that, formally differentiating t with respect to any of the "smaller" functions will yield its exact rate of change related to u or r. Consider the following example:

$$\frac{\partial t}{\partial u}(\tau) = \frac{\partial t}{\partial u} \cdot \frac{du}{dt}(\tau) = 0.58 \cdot 33.85 = 19.63 \quad (11)$$

Therefore, for each 1 unit the Urban Total shifts, the Total amount will shift 19.63 units. Entirely analogous steps may be performed in order to conclude that for each 1 unit shift in the Rural Total, the Total amount will shift 8.59 units.

4. CONCLUSIONS

Although tourism and culture have had their share of obstacles and challenges, the most recent due to the Covid-19 pandemic, people will continue to give special importance to tourism and cultural activities, especially due to the positive impact on well-being.

Because cultural values are changing, a simple analysis of the changes of perception on the importance of free time in Romania has emphasized that there are significant changes in the percentages of people who think leisure time is very important. Moreover, the share of people in Romania who perceived leisure time as very important has almost doubled in under 25 years.

Because of the accelerated rate of change, the analysis must be deepened to ensure a more accurate understanding of the phenomenon. The purpose of this paper is to try to answer whether the evolution of expenditures on cultural and tourist activities has had an upward evolution so as to justify the increase in the share of people who attach great importance to leisure time. A mathematical analysis on longitudinal statistical data sets was performed. By modelling 1) average monthly total income per household, by income categories and main social categories, by residence areas and 2) average monthly expenses per household for services by main social categories, by residence areas, both for the 2001–2020-time frame, it has been revealed that, for the time frame considered, there has been a linear upward evolution of expenditure on tourism and cultural activities. And the model predicted that this trend would continue, and *by February 2033, the total expenditure on tourism and cultural activities by a Romanian household will surpass the* 1000lei *milestone (*average monthly expenses per household).

The results showed that the growing importance of leisure time suggested by the analysis of WVS data is also supported by the evolution of spending on tourism and cultural activities. The question that arises is whether cultural values are stable enough to be used in the cultural characterization of countries based on scores of cultural dimensions.

Among the limitations of the research is the fact that only one characteristic of the *indulgence vs. restraint* cultural dimension was considered. An in-depth analysis of several characteristics is necessary before it can be stated with certainty that the cultural characterization given by this cultural dimension is no longer relevant. However, the current importance attributed to leisure time, as a characteristic of the *indulgence vs. restraint* cultural dimension, would place Romania rather towards *indulgence*.

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